Biology and Taxonomy of *Rhagoletotrypeta* (Diptera: Tephritidae): A New Species from Cuba and New Host Plant, Parasitoid, and Distribution Records from Northwestern Argentina

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ABSTRACT *Rhagoletotrypeta argentinensis* (Aczél) was recovered from *Celtis iguanaea* (Jacquin) Sargent, and *R. parallela* Norrbom and *R. pastranai* Aczél from *Celtis pubescens* (Kunth) Sprengel fruit (Ulmaceae) in the provinces of Catamarca, Tucumán, and Salta (northwestern Argentina). All represent new host plant records, and for *R. parallela*, the first host plant record. Mean pupal weight of flies from *C. pubescens* (mean fruit weight 1.2 g) was 5.2 ± 2.3 mg and of flies from *C. iguanaea* (mean fruit weight 1.8 g) was 7.8 ± 1.3. Mean degree of infestation (number of larvae/100 g of fruit) was 29.6 for *C. iguanaea* and varied between 18.7 and 50.5 for *C. pubescens*. Most adults emerged after an 8–12-mo diapause period. Sixteen specimens of the larval-prepupal parasitoid *Utetes* sp., near *U. anastrephae* (Viereck) (Hymenoptera: Braconidae, Opiinae) were recovered from all fruit samples (overall parasitization rate was 37.2%). Parasitoids entered diapause that lasted up to 12 mo. We also describe a new species of *Rhagoletotrypeta* from Cuba belonging to the *xanthogastra* species group. *Rhagoletotrypeta cubensis* Norrbom, n. sp., is the only species in this genus known from the West Indies. The distribution records reported here also extend the known ranges for all four species of *Rhagoletotrypeta* known from Argentina. We discuss our findings in light of their taxonomic and ecological significance and with respect to the possibilities they open for the badly needed study of the zoogeography and behavior of flies in tephritid genera of no apparent economic importance.

KEY WORDS *Rhagoletotrypeta cubensis* n. sp., Tephritidae, *Celtis*, taxonomy, host plants

Rhagoletotrypeta Aczél is a Nearctic and Neotropical genus of Tephritidae that includes nine previously described species. Norrbom (1994) recognized two species groups: the *annulata* group, including *R. annulata* Aczél, *R. argentinensis* (Aczél), *R. intermedia* Norrbom, *R. morgantei* Norrbom, *R. rohweri* Foote, and *R. uniformis* Steyskal; and the *xanthogastra* group, including *R. parallela* Norrbom, *R. pastranai* Aczél, and *R. xanthogastra* Aczél. The total geographic range of *Rhagoletotrypeta* extends all the way from the northeastern United States to Argentina, but there are large gaps in the distribution (Norrbom 1994). Most species are known from small numbers of specimens and localities (i.e., northeastern and southwestern United States, Mexico, Costa Rica, southern Brazil, Paraguay, Uruguay, and northern Argentina), suggesting that the full diversity of the genus and the ranges of the species are probably greater (Norrbom 1994, Smith and Bush 1999).

Rhagoletotrypeta is classified within the subfamily Trypetinae, tribe Carpomyini, subtribe Carpomyina and is closely related to *Cryptodacus*, *Haywardina*, and *Zonosemata* according to the recent phylogeny of the Carpomyina by Smith and Bush (1999). Within the latter genera, detailed studies of biology and behavior have been made for only two species within *Zonosemata* [*Z. vittigera* (Coquillett) and *Z. electa* (Say)] (Burdette 1935, Foote 1968, Goeden and Ricker 1971, Greene et al. 1987, Whitman et al. 1988, Prokopy and Papaj 1999). Both species attack plants within the Solanaceae (*Z. electa* is a pest of pepper) and are thus considered of economic importance. For *Z. vittigera*, it has been postulated that the adults mimic the territorial displays of jumping spider predators (Greene et al. 1987).

To date, the only known aspects of the biology and ecology of species of *Rhagoletotrypeta* are the occurrence times of adults and the host plant associations of some species (Smith and Bush 1999). The few known host plants belong to the genus *Celtis* Linnaeus (Norrbom 1994), variously classified in the family Celtidaceae or Ulmaceae. Here, we report the results of a study on the basic biology of three *Rhagoletotrypeta* species in northwestern Argentina, including new host plant, distribution, and parasitoid data. We also describe a new species of *Rhagoletotrypeta* from Cuba.

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Materials and Methods

Collection Sites in Argentina. Collections were made at four sites in northwestern Argentina. Two are located in Catamarca Province (Ambato department, Los Varela: 27° 56′ S, 65° 52′ W, elevation 880 m; and Paclín department, La Merced: 28° 10′ S, 65° 41′ W, 860 m), one in Salta Province (Candelaria department, La Candelaria: 26° 05′ S, 65° 05′ W, 820 m), and one in Tucumán Province (Trancas department, San Pedro de Colalao: 26° 14′ S, 65° 30′ W, 1080 m). The climate of all four localities is characterized as dry steppe (*BS* according to Köppen's climatic classification), with a rainy and warm summer (November–April) and a dry and cold winter (May–October). The temperature of the warmest month is >22°C, mean annual rainfall is between 400 and 600 mm, and precipitation of the rainiest month is ≥10 times the precipitation of the driest month (Torres-Bruchmann 1976, Anonymous 1992).

The native vegetation of this region is a subtropical dry forest, locally known as "Provincia Fitogeográfica Chaqueña" or "Chaco" (Cabrera and Willink 1973). This floristic unit is characterized mainly by thorny shrubs and trees (Cabrera 1976). At present, great sectors of this native forest are being devastated by logging and cattle ranching.

Fruit Sampling. Between March and April 1999, fruit of two *Celtis* species [*C. pubescens* (Kunth) Sprengel and *C. iguanaea* (Jacquin) Sargent] were sampled in areas with unperturbed native vegetation. Individual samples consisted of ripe fruit still on the tree and ranged in number from 50 to 220, depending on availability. The fruit was collected from two trees of *C. iguanaea* in San Pedro de Colalao and from six trees of *C. pubescens* (two in Los Varela, one in La Merced, and three in La Candelaria). Each sample was individually placed into cloth bags, which were transported inside a plastic crate to the laboratory of the Centro de Investigaciones para la Regulación de Poblaciones de Organismos Nocivos (CIRPON) in San Miguel de Tucumán, located in the Tucumán Province at 26° 50′ S, 65° 13′ W, 426 m. There, all fruit of each sample were counted, and then each fruit was weighed, rinsed with a 20% solution of sodium benzoate, and individually placed in a plastic container with damp sand in the bottom as a pupariation substrate for fly larvae.

Processing of Larvae and Pupae. Sand in each plastic container was sifted daily to collect fly larvae or pupae. If fruit showed signs of decomposition, they were dissected to remove all third instars and pupae, which were transferred to small plastic cups filled with sterilized moist sand and kept under ambient conditions in a room protected from rainfall but with no further environmental control for up to 15 mo. A hygrothermograph was placed in the room to monitor temperature and relative humidity. The cups containing fly pupae were covered with organdy cloth to keep adult insects from escaping. These cups were inspected daily to remove emerging adult flies and parasitoids for identification. The sand in the bottom of the cups was remoistened weekly for 2 mo after the date of fruit collection (i.e., May–June 1999). Sand also was regularly remoistened between December 1999 and May 2000.

Insect and Plant Identification. Fruit fly and parasitoid adults were identified by Allen Norrbom and Sergio Ovruski, respectively. Voucher fruit fly specimens are kept in the National Museum of Natural History (Smithsonian Institution, Washington, DC) and Fundación Miguel Lillo (FML) (San Miguel de Tucumán, Argentina). Voucher parasitoid specimens were deposited in the FML. Nomenclature for fruit flies and parasitoids follows Norrbom (1994) and Wharton (1997), respectively. Dried plants were compared with herbarium specimens at the FML and formally identified by Cristina Martín (Cátedra de Fanerógamas, Facultad de Ciencias Naturales e Instituto Miguel Lillo, Universidad Nacional de Tucumán-FCNeIML, UNT). Nomenclature for plants follows Dottori and Hunziker (1994).

Taxonomy. The description of the new species is based on one male specimen collected in Sierra Rangel (Pinar del Río, Cuba) in 1963. Morphological terminology follows White et al. (1999).

Preparation of Genitalia. Genitalia were removed by breaking off the abdomen from the thorax and boiling it in 10% KOH for a few minutes to dissolve soft tissue. The genitalia were dissected in distilled water and then transferred to glycerin for illustration and permanent storage in a microvial.

Data Presentation. All parasitism values and fruit infestation levels reported here are based on the number of emerging adult flies and parasitoids and on the number of fruit fly larvae per 100 g of fruit, respectively. Where appropriate, means and standard deviations were calculated as summary statistics for the pupal weight, length of the pupal period, and individual weight of fruit.

Results

Infestation Rates, Host Plant Associations, and Pupal Weight. A detailed summary of fruit sampling data per study site is shown in Table 1. In total, 581 fruit (≈700 g) belonging to two *Celtis* species were collected, of which 31.3% were infested by 183 larvae. In total, 136 pupae were harvested between 2 and 9 d after the date of fruit collection (47 larvae died before pupating). Mean pupal weight was 5.2 ± 2.3 mg ($n = 11$) and 7.8 ± 1.3 mg ($n = 12$) for those harvested from *C. pubescens* and *C. iguanaea*, respectively. From these pupae, 27 adult flies representing three *Rhagoletotrypeta* species were recovered: 15 (≈56%) were *R. pastranai*, 11 (≈40%) were *R. argentinensis*, and only one specimen (≈4%) was *R. parallela*. *R. argentinensis* was recovered from *C. iguanaea*, whereas both *R. pastranai* and *R. parallela* were reared from *C. pubescens*. Additionally, 16 parasitoids belonging to *Utetes* sp. near *U. anastrephae* (Viereck) (Hymenoptera: Braconidae, Opiinae) were recovered from all the samples. The parasitoid specimens recovered from all collecting sites are very similar to each other and probably represent only one species of *Utetes.* Total parasitization rate on all fruit samples was 37.2%.

In general, there was one *Rhagoletotrypeta* larva per *Celtis* fruit. Only one fruit of *C. iguanaea* (≈2% of a total of 66 infested fruit) yielded two larvae. The degree of infestation in *C. pubescens* varied between the collection sites (Table 1). For example, there were 2.7-fold differences in the infestation levels when comparing the Los Varela and La Candelaria localities. Note, too, that fruit sample size in both collection sites was similar (Table 1). Overall, fruit infestation rate (i.e., considering all fruit sampled from both *Celtis* species) was 27.5 larvae per 100 g of fruit.

A high percentage of dead pupae was observed in all fruit samples. For example, 37.6, 16.1, 10.5, and 25.8% of all dead (i.e., uneclosed) pupae were desiccated; showed signs of fungal, bacterial, or viral attack, or a combination; or were affected by other mortality factors (e.g., sting by parasitoid).

Fly and Parasitoid Emergence Periods. Most of the *Rhagoletotrypeta* adults emerged 8–12 mo after the pupae were harvested. For example, 55% of the total *R. argentinensis* individuals emerged after 9–12 mo, whereas 67% of the total *R. pastranai* individuals emerged after 8–10 mo. Thus, the pupal period for *R. argentinensis* averaged 16.2 ± 3.4 (n = 5) and 308.5 ± 30.1 d (n = 6), and for *R. pastranai* 24.2 ± 7.5 (n = 5) and 256.3 ± 34.6 d (n = 10), under natural conditions. Similarly, 83% of the total parasitoids that emerged from *R. argentinensis* pupae were recovered after 11–12 mo, and 70% of the total parasitoids that emerged from the other *Rhagoletotrypeta* pupae (mostly *R. pastranai*) were obtained after 10–11 mo. Thus, the length of the pupal period for parasitoids averaged 27.5 ± 7.1 (n = 4) and 323.8 ± 46.5 d (n = 12) under natural conditions, respectively.

Description of New Species from Cuba

Rhagoletotrypeta cubensis Norrbom, n. sp.
(Figs. 1 and 2)

Oedicarena sp. Foote 1980: 38, Fig. 88.

Diagnosis. *R. cubensis* belongs to the *xanthogastra* species group, as indicated by the presence of a sublateral white vitta on the scutum, the relatively short medial surstylus, and the distinct anterior lobe on the lateral surstylus. It differs from the other species of the *xanthogastra* group in having relatively broad wing bands, especially the apical band (e.g., hyaline area between subapical and apical bands not extended into cell r_{2+3}), and less extensive brown markings on the thorax (e.g., scutum without presutural brown markings, and postsutural brown marks not extended to dorsocentral seta; and scutellar brown basal mark extremely short, not extended to level of basal seta and portion on disk narrowest medially). In *R. parallela,* which has the scutellar brown mark relatively small, the part on the disk is more semicircular, and this species also differs in wing pattern, having the discal and subapical bands parallel and lacking the accessory

Table 1. Analysis of fruit samples infested by *Rhagoletotrypeta* species in three provinces of northwestern Argentina

Collection site	Host plant species	Total no. of fruit sampled	Total wt (g) and mean ± SD individual wt of fruit sampled	No. and % fruit infested	Total no. of larvae and no. of larvae/fruit	Degree of infestation (larvae/100 g of fruit)	No. of recovered *Rhagoletotrypeta* pupae and adults		No. of recovered parasitoids	% parasitism
S.P. Colalao	*Celtis iguanaea*	151	226.7 (1.8 ± 0.5)	66 (43.7)	67 (1–2)	29.6	54	11[a]	6	35.4
Los Varela	*Celtis pubescens*	102	105.5 (1.1 ± 0.3)	53 (51.9)	53 (1)	50.5	36	13[b]	2	13.3
La Merced	*Celtis pubescens*	212	206.5 (1.3 ± 0.4)	39 (18.4)	39 (1)	19.1	27	2[c]	6	75.0
La Candelaria	*Celtis pubescens*	116	127.6 (1.2 ± 0.6)	24 (11.3)	24 (1)	18.7	19	1[d]	2	66.7

[a] Specimens of *R. argentinensis.*
[b] Specimens of *R. pastranai.*
[c] One specimen of *R. pastranai* and one of *R. parallela.*
[d] Specimen of *R. pastranai.*

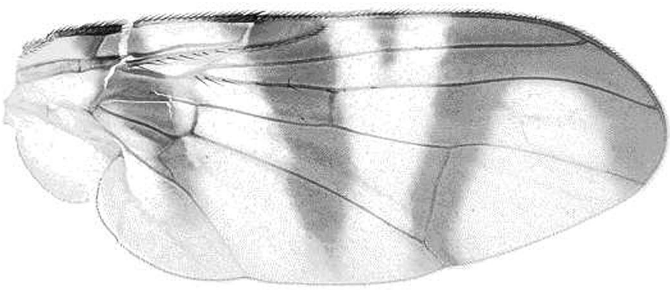

Fig. 1. *R. cubensis.* Wing of holotype.

costal band present in *R. cubensis* as well as *R. pastranai* and *xanthogastra.*

Description. Body length 5 mm. Wing length 4.3 mm. Mesonotum length 2.3 mm. Body predominantly yellow to orange with dark brown markings. Setae dark brown to black. Head yellow except reddish ocellar tubercle. Frons with three frontal and two orbital setae. Antenna short, extended about one-half distance to ventral facial margin; first flagellomere 1.7 times as long as wide (on mesal side), rounded dorsoapically. Thorax mostly orange, with following white areas: postpronotal lobe; triangular area on anepisternum, including dorsal margin and dorsal half of posterior margin; greater ampulla; medial and sublateral scutal vittae (unpaired medial vitta broad and rounded posteriorly, including base of acrostichal seta and reaching posterior scutal margin; sublateral vitta extended from transverse suture to intra-alar seta but not reaching posterior scutal margin); and most of scutellum. Dark brown markings of thorax restricted to following: anterior two-thirds of notopleuron; L-shaped medial mark on anepisternum; short broad vitta posteriorly on scutum between medial and sublateral white vittae, almost reaching dorsocentral seta anteriorly, narrowly separated on posterior margin; lateral postsutural margin of scutum, lateral to postsutural supra-alar seta; most of anepimeron, katatergite, anatergite, subscutellum and mediotergite; extreme base of scutellum on disk and side, not extended to level of basal scutellar seta, mark on disk narrowest medially. Dorsocentral seta located at 0.45 distance from level of postsutural supra-alar seta to that of intra-alar seta. Scutum apparently mostly nonmicrotrichose, but surface partially obscured by fine debris and area near transverse suture damaged by pin. Scutellum entirely microtrichose. Legs yellow except brown tibiae. Wing (Fig. 1) predominantly hyaline with five brown bands: subbasal band from crossvein h to base of vein A_1+Cu_2; discal band from pterostigma to posterior margin near midpoint between apices of veins A_1+Cu_2 and Cu1, covering crossvein r-m; narrow accessory costal band, extended into cell r_{2+3}, but only faintly reaching vein R_{2+3}; relatively broad subapical band, divergent from discal band anteriorly; and relatively broad anterior apical band, broadly connected anteriorly to subapical band, covering all of cell r_{2+3} distal to subapical band, and broadly covering apex of vein M (its width measured

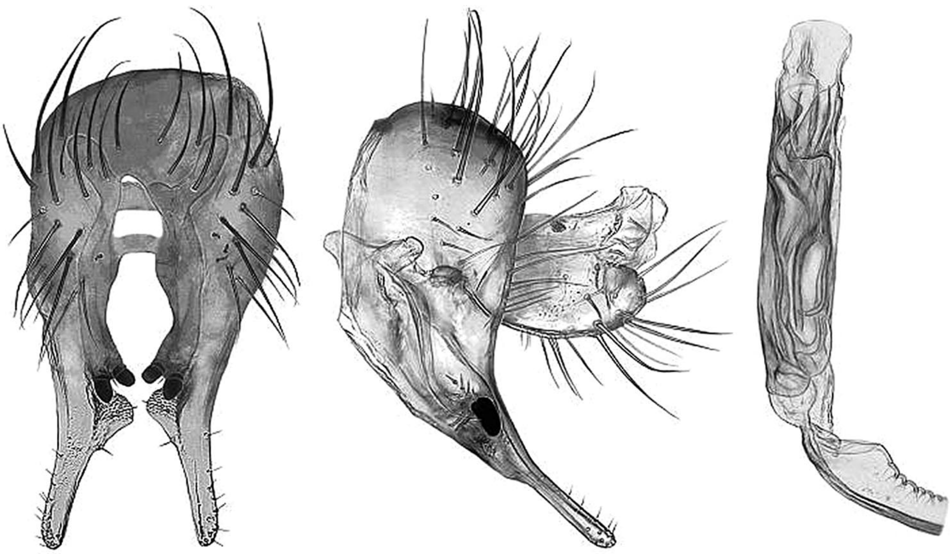

Fig. 2. *R. cubensis.* Male terminalia.

at apex of vein R_{4+5} approximately one-half width of hyaline area between it and subapical band measured along vein M). Crossvein r-m at 0.53 distance from crossvein bm-Cu to crossvein dm-Cu. Abdomen yellow except for minute sublateral brown spot on tergite 4 and large triangular lateral brown spot on tergite 5. Male terminalia (Fig. 2) with medial surstylus short; lateral surstylus with distinct anterior (mesal) lobe and moderately long posterior lobe; glans relatively slender, strongly and complexly sclerotied without distinctive apical or subapical lobes.

Holotype. Male (USNM00214164), CUBA: Pinar del Río: Sierra Rangel, IV 1963, F. de Zayas, deposited in National Museum of Natural History, Smithsonian Institution.

Remarks. Foote (1980) reported the holotype as a species of Oedicarena. Norrbom et al. (1988: 102) indicated that it was not an *Oedicarena* and might be a species of *Rhagoletotrypeta*, but it was overlooked by Norrbom (1994) in his revision of the latter genus.

Etymology. This species is named for Cuba, the country where the holotype was collected.

Material Examined of Other Species

The following specimens of other *Rhagoletotrypeta* species were examined

Rhagoletotrypeta argentinensis (Aczél)

ARGENTINA: Tucumán: San Pedro de Colalao, 26° 14′ S 65° 30′ W, 1,080 m, reared ex fruit of *C. iguanaea* coll. 17-IV-99, S. Ovruski, 2 ♂♂, 5 ♀♀, 3 pupae (USNM00215033-39).

Rhagoletotrypeta parallela Norrbom

ARGENTINA: Catamarca: La Merced, 28° 10′ S 65° 41′ W, 860 m, reared ex fruit of *C. pubescens* coll. 16-III-99, S. Ovruski, 1 ♀, 1 pupae (USNM00215051).

Rhagoletotrypeta pastranai Aczél

ARGENTINA: Catamarca: La Merced, 28° 10′ S 65° 41′ W, 860 m, reared ex fruit of *C. pubescens* coll. 16-III-99, S. Ovruski, 1 ♀ (USNM00215052); Los Varela, 27° 56′ S 65° 52′ W, 880 m., reared ex fruit of *C. pubescens* coll. 16-III-99, S. Ovruski, 2m5f4p (USNM00215043-49). Salta: La Candelaria, 26° 5′ S 65° 5′ W, 820 m, reared ex fruit of *C. pubescens* coll. 31-III-99, S. Ovruski, 1 ♂ (USNM00215053).

Rhagoletotrypeta xanthogastra Aczél

ARGENTINA: Salta: Chaco Occidental, Los Colorados, 100 km NE, I-1993, M. McLaughlin & B. Bestelmeyer, 1 ♀ (Colorado State University; USNM00213743).

Key. The following modifications to the key of Norrbom (1994) are provided to include *R. cubensis.*

2. Accessory costal band absent (Fig. 6F). Discal and subapical bands parallel. Scutellum with basal seta within white area, but with medial brown area semicircular and extending posteriorly along midline to or posterior to level of basal seta . . . . *parallela* Norrbom

Accessory costal band at least faintly present. Discal and subapical bands divergent anteriorly. Scutellum with basal seta within brown area, or if in white area, medial brown mark truncate and very short, not extending to level of basal seta 3A

3A. Wing bands relatively narrow, cell r_{2+3} with large subapical hyaline area between subapical and apical bands. Scutellum with basal brown area large, including basal seta. Scutum usually mostly dark brown anterior to transverse suture, at least with large presutural brown marks along dorsocentral line. Notopleuron entirely brown or at most yellowish along posterior margin 3

Wing bands relatively broad, apical band covering all of cell r_{2+3} distal to subapical band. Scutellum with basal brown area small, narrowly bordering scuto-scutellar suture, basal seta in white area. Scutum without presutural brown markings. Notopleuron white posteriorly surrounding posterior seta . . . . *cubensis* Norrbom

Discussion

The distribution records reported in this article include the first report of *Rhagoletotrypeta* from the Greater Antilles and extend the known ranges for all four of the species of *Rhagoletotrypeta* known from Argentina. *R. cubensis* is also the first species of the *xanthogastra* species group known from outside of subtropical South America. The three previously described species are known from southern Brazil, Paraguay, Uruguay, and northern Argentina. *R. pastranai* (previously reported from Salta and the central province of Córdoba as well as Buenos Aires, southern Brazil, Paraguay, and Uruguay) and *R. parallela* (previously reported only from the northwestern province of Salta), are here reported to occur in the province of Catamarca. *R. argentinensis* (previously known only from two specimens from unknown localities in Argentina) is here documented to occur in the province of Tucumán, and *R. xanthogastra* (previously known from the provinces of Tucumán and Córdoba) (Aczél 1951, 1954; Norrbom 1994) is reported here to also occur in Salta. Thus, the geographic range of the genus *Rhagoletotrypeta* in Argentina extends throughout most of the northwestern part of the country (provinces of Salta, Tucumán, and Catamarca) to central Argentina (province of Córdoba) and (*R. pastranai* only) eastward to Buenos Aires.

C. iguanaea is the first recorded host plant for *R. argentinensis*, and *C. pubescens* is recorded for the first time as a host of *R. parallela* and *R. pastranai.* Both *Celtis* species are native to the Chacoan floristic region of Argentina (Cabrera 1976). The only previously recorded host plant for *R. parallela* was an unidentified species of *Celtis* (Norrbom 1994, Smith and Bush 1999), whereas *R. pastranai* was previously reared from fruit of *C. ehrenbergiana* (Klotzsch) Liebm. in

Sierra Zala (San Javier department, Córdoba province), Argentina (Aczél 1954; host as *C. tala* Gillies ex Planch.), and from *C. iguanaea* in southern Brazil (Norrbom 1994). We believe that the status of *C. tala* as a host of *R. pastranai* requires confirmation.

Although the number and sizes of fruit samples were small, the results of this study indicate a relatively constant number of larvae per *Celtis* fruit in natural infestations. *C. pubescens* and *C. iguanaea* have small, light fruit (Table 1), which most likely restricts the number of *Rhagoletotrypeta* larvae that can develop in them. We still need to determine whether females lay only one egg per oviposition bout or whether only one larva is able to survive under multiple oviposition conditions.

The braconid species recovered in the current study is similar to *U. anastrephae,* a koinobiont solitary endoparasitoid of tephritid larvae widely distributed in the Neotropical Region (Ovruski et al. 2000). Interestingly, this fruit fly parasitoid species, along with the braconids *Doryctobracon areolatus* (Szépligeti), *D. brasiliensis* (Szépligeti), and *Opius bellus* Gahan were recorded from *R. pastranai* from *C. iguanaea* in Brazil (Leonel et al. 1995, 1996). However, our specimens, like those identified as *U. anastrephae* from *R. pastranai* in Brazil, could be another species of *Utetes* (Robert A. Wharton, Texas A & M University, personal communication; and there is evidence that *U. anastrephae* could actually be a complex of closely related species; Wharton 1997). All species of the *Utetes anastrephae* group are in need of revision (R.A. Wharton, personal communication), thus the *Utetes* species recovered from *Rhagoletotrypeta* spp. in this study cannot be further identified at present.

We discovered, for the first time, the existence of diapause in both *R. pastranai* and *R. argentinensis.* Entering diapause allows *R. argentinensis* and *R. pastranai* to survive the period when their host plants are unavailable, for example during the cold and dry winter. According to Romanczuk and Martinez (1978) and Legname (1982), *Celtis* species bear fruit during November–December and then again during March–April (warm and humid season) in northwestern Argentina. Diapause in tephritid flies of the tribe Carpomyini (Tephritidae: Trypetinae) has been repeatedly reported in temperate zones (Frick et al. 1954, AliNiazee 1968, Prokopy 1968). For example, field studies conducted in western North America indicate that several *Rhagoletis* species overwinter as diapausing pupae in the soil (AliNiazee 1968, 1974, 1985). However, diapause in tephritid fruit flies has not been well studied in tropical and subtropical environments (Aluja et al. 1998, 1999).

We also provide evidence that the parasitoids stemming from larvae of both *R. pastranai* and *R. argentinensis* exhibited diapause. Given the discontinuous supply of host larvae, diapause seems to be necessary for this parasitoid species in subtropical northwestern Argentina. Entering diapause under these circumstances would allow parasitoids to emerge in times of relative host abundance, for example, during March–April when *Celtis* fruit are mainly abundant (S.M.O., unpublished data). Aluja et al. (1998) have recently provided clear evidence that diapause is an effective mechanism allowing *Anastrepha* parasitoids in tropical environments to bridge periods during which host larvae are scarce or unavailable. One of these parasitoid species is *U. anastrephae,* which can enter diapause during the dry season in Mexico (Sivinski et al. 2000).

In conclusion, we now have evidence that the distribution of *Rhagoletotrypeta* is much wider than previously believed and provide further evidence that there is a close association between flies in this genus and plants in the genus *Celtis.* The latter opens up the possibility of studying the behavior of individuals belonging to various *Rhagoletotrypeta* species from Argentina. As discussed by Aluja (1999) and various authors in Aluja and Norrbom (1999), learning more about the behavior of noneconomically important tephritids is needed because $<5\%$ of the $>4,400$ described species are considered pestiferous. For *Rhagoletotrypeta* in particular, information on behavior would be useful for deciphering evolutionary patterns of, for example, oviposition (including host marking) and mating behavior of the Carpomyina (Trypetinae: Trypetini) and other related groups.

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